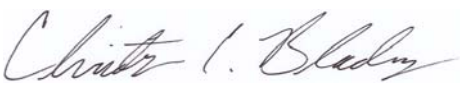
**National Aeronautics and Space Administration**
**Washington, DC**

# NASA ADVISORY COUNCIL

**July 20, 2006**

**Hilton Houston NASA Clear Lake**
**Houston, TX**

## MEETING MINUTES



**Christopher C. Blackerby**
**Executive Director**

**Harrison H. Schmitt**
**Chair**

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*Meeting Report Prepared By:*
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***General Discussion***

Senator Harrison H. Schmitt, Chair of the NASA Advisory Council (the Council) called the meeting to order at 8:10 a.m. and welcomed Council members and meeting attendees to the Council's fourth meeting. All of the background from the last meeting is available on the Council's website, www.hq.nasa.gov/office/oer/nac, including a letter to the Administrator with the Council's second set of recommendations. A detailed status of these recommendations is available through the Executive Director, Mr. Christopher Blackerby. Senator Schmitt reminded everyone that the full Council meeting is open to the public and held in accordance with the Federal Advisory Committee Act (FACA). He thanked Mr. Michael Coates, Director of the Johnson Space Center (JSC) and his excellent staff in assisting with the logistical planning of the meeting, including an exceptional tour of some of the Center facilities on July 19.

Senator Schmitt reviewed the current organization of the Council. He noted that Dr. Juan Alonso has accepted a position at NASA Headquarters in the Aeronautics Research Mission Directorate (ARMD) and has resigned from the Council. As discussed at the last meeting, the Council has been moving ahead to appoint members for the new Space Operations Committee, which will be focused on the longer-term operations of the International Space Station (ISS) and related issues. Several individuals who have been invited to join the Council are under review by NASA's Office of General Council. Dr. David Longnecker, initially an ex-officio member of the Council, is now a full member and is on the Space Operations Committee. He will continue to serve on the Ad Hoc Biomedical Committee. Senator Schmitt showed the organizational chart of the new Council structure. He reminded everyone that if the Committees have a need to form specialized Subcommittees to please contact him.

As discussed at the meeting in May, the Lunar Exploration Program Analysis Group and the Mars Exploration Program Analysis Group will report through the Planetary Science Subcommittee of the Science Committee. The Outer Planets Assessment Group, the Venus Exploration Analysis Group, and the Curation and Analysis Planning Team for Extraterrestrial Materials will also be reporting through the Planetary Science Subcommittee.

To date, the Council has sent two major sets of recommendations before the Administrator. To facilitate the flow of recommendations, Senator Schmitt requested that by the Friday of the week following the Council meeting, he would like to have a draft of the recommendations with all of the background information.

Each of the five Committees gave its report and brought forward recommendations for discussion.

***Audit and Finance Committee Report and Discussion***

Mr. Robert Hanisee reported on the Audit and Finance Committee. He thanked the members of the JSC financial staff, who presented to the Committee on the previous day. The Committee met with John Beal, the JSC Chief Financial Officer (CFO), and members of his staff.

The root of one problem is having ten Centers with ten different accounting systems with a high degree of autonomy. In the process of moving toward a unified accounting system, difficulties have been encountered along the way, and the Agency has failed to get a "clean" audit. The Committee is going through the process of understanding the problems at the same time the Agency is trying to fix them. JSC had an accounting system that provided accurate and timely data, and the switch to the Integrated Enterprise Management Program (IEMP) and the Systems Applications and Products' (SAP) accounting system was a difficult transition. The SAP system is a complex and good system but is somewhat lacking in flexibility, and all of the input rules must be followed. Training to a detailed level is required.

In response to the General Accounting Office (GAO) report, the CFO prepared a Corrective Action Plan that was submitted to GAO in January 2006. The Committee has reviewed this Plan and finds it to be a good one. The Corrective Action Plan addresses the deficiencies in the audit. There were three areas of material weakness (Analysis and Systems Oversight, Fund Balance with Treasury, and Property Plant and Equipment) and one reportable condition (Environmental Liabilities). Fund Balance with Treasury and Property Plant and Equipment continue to be weaknesses. In addition to these four major items, three areas were listed as areas of concern: resource constraint; change management; and external support-contractor reporting.

The Agency is in the process of adding a new upgrade accounting module to the SAP system in 2007, and a property accounting module is expected in 2008. Each change causes turmoil in the system and requires additional training. The Agency is looking for ways to make contractor reporting more effective. The Deputy CFO reported on financial system progress. The new module of the SAP system will be implemented in October, and the new system is currently in testing and on schedule. Steady progress is being made on out of balance funds with Treasury and the number of items has shrunk dramatically. The full out of balance amount is now down to one-tenth of one percent of the NASA budget. JSC appears to be the star performer in this area. Of the 500 outstanding items, only five are at JSC, although this Center has 25% of the NASA budget.

Mr. Hanisee noted that there will always be some systemic items, e.g., the timing of payments to foreign vendors. There are a number of issues with property plant and equipment, although progress is being made. The problem arises because some years ago, the Agency was required to put some legacy satellite programs on its books, and there was insufficient documentation of those transactions. The CFO and staff have

developed a proposal to address this issue. The proposal has been made to the Accounting Standards Board and is under consideration. The proposal is to get a waiver to accrual accounting for satellites that have been launched and are in operation. If the proposal is accepted, the problem will go away very quickly. There are also other potential solutions to the problem. In response to a question from the Chair, Mr. Hanisee said there is no precedent for accounting for launched satellites. There is a new SAP property accounting module that will have its own rules for capitalization and write-off of legacy assets. A second meeting with the Board has been scheduled for September 12.

The second issue with property plant and equipment is associated with assets held at contractor sites. NASA has had to rely on the Defense Contract Audit Agency (DCAA) for inventory of these assets, and this item has not received a lot of focus from that agency. Furthermore, tracking tends to be done early or mid-year and timeliness is not very good. Further work needs to be done on NASA assets held at contractor sites.

The Agency has made tremendous progress on environment liabilities. A US Navy module has been adapted and using that model, NASA has identified and quantified all of the environmental liabilities. This issue should be resolved quickly. The Office of the Chief Financial Officer (OCFO) has hired Price Waterhouse Coopers to help with validation of this model. The audit for 2006 is underway and testing has begun. The Committee will have a conference call with the Inspector General (IG) sometime in August to see where it stands with the audit report. The Audit and Finance Committee expects to be kept in the loop. So far, there are no showstoppers in the year-end audit.

Personal resource constraints are becoming serious. The financial office has been authorized a number of new positions, but people continue to leave. This creates problems in continuity, training, etc. At the present time, the office is 25 persons under the authorized level, and this is impacting the accounting and reporting activities. Ten hiring offers have been made.

The Committee wants to have a second meeting with the GAO to discuss property related issues. There may be a possibility that GAO may give the Agency a “fresh start” and do the audit from implementation of SAP mid-year. Mr. McPherson added that the attempt is to get opening account balances to reconcile with Treasury, rather than try to reconstruct several years of business. Mr. Hanisee noted that one of the problems with the SAP system is flexibility. The people who are making inputs are not skilled in using this accounting system, and the system does not allow “caching” while amounts are being checked for accuracy. There is a cumbersome procedure to cancel out and input revised numbers. The JSC accounting staff was happy to bring on accounting people from Enron, where SAP was used extensively. These people were highly knowledgeable in the system, and JSC has been able to get on top of the problem. The CFO receives an error report on a weekly basis before the errors get to the general ledger. This system is potentially highly useful to the entire Agency. The Committee will meet with the IEMP Program Manager in October to hear detailed presentation on the entire IEMP program.

In response to a question from Senator Schmitt, Mr. Hanisee indicated that there is precedent for writing off assets that disappear; however, many satellites that have been launched and are performing have not "disappeared." These assets continue to be useful. This is an interesting accounting principle and Gen. Lyles noted that there are some parallels with weapons systems in the Department of Defense. Gen. Lyles said that DOD also has satellites and he believes that they have handled this situation. He has not heard any examples of such a problem within DOD. Mr. Montelongo added that the Accounting Board is dealing with some other agencies that have similar issues.

Recommendations:

- NASA should adopt JSC's Error Tracking Tool on an Agency-wide basis. This could help Center management identify and isolate errors before they get to the general ledger.
- NASA should initiate a financial management customer satisfaction survey for managing contractor relationships. This has been implemented at the Department of Agriculture. It could provide a useful tool for program and Center managers.

At this point, Senator Schmitt asked that the Executive Secretaries of all of the Committees have the drafts of their recommendations and supporting background information to Mr. Blackerby by next Friday (July 28).

***Science Committee Report and Discussion***

Dr. Charles Kennel reported on the Science Committee. He noted that the Committee had an excellent presentation from Dr. Paul Hertz and outstanding support from Mr. Greg Williams. One of the responsibilities of the Science Committee and Subcommittees has been to guide the planning for Lunar Science. A Workshop will be held the week of February 26, 2007, and considerable progress has been made since the last meeting. The Science Committee also is reviewing the development of the Science Plan, due in December 2006.

There have been many formal and informal expression of concern about NASA's science direction. The Committee now has five Subcommittees in place. These Subcommittees had their first major meeting in May. At that time, some important conclusions were reached. The Subcommittees also met again this month, and the Science Committee has received extensive written reports from three of the Subcommittees. The Subcommittees were concerned about the flow of information and recommendations up and down the advisory chain in order to allow timely feedback. The goal is to provide timely feedback to the Subcommittees on the recommendations. Dr. Kennel described the formal recommendations flow: from the Science Subcommittees to the Science Committee to the Council to the NASA Administrator, then down to the Science Mission Directorate (SMD). There are informal pathways to SMD, but the Subcommittees receive no near-term, formal feedback from SMD. The Committee is recommending dividing the recommendations into strategic and tactical. Strategic recommendations would require the attention of the Council and the Administrator. Tactical recommendations are ordinarily of the nature that would be under the authority of SMD, and they would be

transmitted through the Science Committee to SMD; strategic recommendations would follow the current path. Dr. Kennel provided examples of strategic and tactical recommendations. A tactical recommendation would be comments on the Science Plan sections. The Committee recommended that the Council adopt this procedure.

Senator Schmitt noted that the Committee would need to have very persuasive arguments for this change, since it appears to be contrary to the structure desired by the Administrator. Dr. Griffin wants one advisory structure, and this is a movement back to what existed before. If SMD wants to respond quickly back to the Council, there is a path for the organization to do that. Dr. Fisk commented that the Administrator has delegated to the SMD Associate Administrator certain authority, and tactical recommendations would be within that delegated authority. Senator Schmitt agreed that there needs to be a more rapid response from the action entities within NASA. There should be regular communication between the Science Committee and the Subcommittee, e.g., via telecons. The Administrator's office has been turning the recommendations around almost immediately. However, from there on, the reaction is slower than desirable.

Dr. Kennel indicated that he has seen improvement in communication with the science community, and informal interactions with SMD are beginning to build a level of trust. One of the goals is to produce greater accountability up and down the line through tracking of recommendations. The formal tracking as well as informal communication are important. However, the formal tracking should be done at the appropriate level in the organization. Senator Schmitt noted that the turnaround problem has been discussed at the Administrator's level, and his Office is putting together a process to speed up response. Dr. Fisk commented that if the Science Committee were to bring forward all of the Subcommittee recommendations, they would bog down the Council meeting. The intent is to streamline the process and at the same time, have a formal process for reporting of tactical recommendations. The Subcommittees' concern expressed to Senator Schmitt at the last Conference was that they did not believe that the Administrator was seeing their letters.

Senator Schmitt suggested that the Subcommittees write a one page executive summary that could be attached to each recommendation. The Council has a configuration control board function, and a tactical recommendation could have implications for other Committees. Ms. DiGennaro suggested tabling this recommendation until the next meeting in October. Dr. Tyson commented on the Research and Analysis (R&A) funding issue. The Subcommittees would consider this a tactical recommendation. Senator Schmitt noted that three of the four Subcommittees made a recommendation on this topic. It is a major concern, although there was not a consensus recommendation on what to do about it. The Administrator knows that R&A is a big issue. Senator Schmitt emphasized that the recommendations are getting to the Administrator rapidly.

The second recommendation involved Subcommittee meetings. Meetings should be planned in a manner that enables an optimal mix of both plenary and individual Subcommittee deliberation over the course of a year. The Science Committee had a view

on how this could be accomplished. Senator Schmitt noted that the Council is depending on SMD to work with the Subcommittee members to find appropriate dates. The meeting dates for 2007 should be established by September of the current year.

Dr. Kennel stated that the overall goal of the recommendations on Subcommittee procedures is to improve the flow of Subcommittee recommendations to NASA and feedback to the Subcommittees. The Science Committee should forward Subcommittee letters as written to SMD, in parallel with Science Committee deliberation. Science Committee presentations to the Council should be made available to the Subcommittees, and Council letters to NASA and NASA's response should be made available to the Subcommittees. Senator Schmitt commented that rather than burden the Administrator with the full Subcommittee letters, there should be an executive summary. Despite belief to the contrary, the Subcommittees' letters are not "lost," and the path being recommended by Dr. Kennel is generally being followed. However, getting a formal response to the recommendations has been slow.

The next recommendation concerned management of small missions. NASA NPD 7120.5D defines common management insight/oversight processes for all missions, with waivers granted on a mission-by-mission basis. The question is whether these processes are appropriate for small missions. The Committee recommends exploring a separate set of procedures for these types of missions. Small missions should have management insight/oversight processes commensurate with their nature (cost, schedule, etc.). The Science Committee will invite the NASA Chief Engineer to discuss this topic in its next meeting. There is no formal recommendation at this time, and the Committee will continue to explore this issue. In response to a question from Senator Schmitt, Dr. Kennel indicated that accurate cost estimation at the beginning is very important. The concern is the additional cost due to layers of oversight. The Committee needs to understand what procedures are essential. The science community is concerned about the gradual run-down of science missions through 2010, and the community would like to see small missions occur as frequently as possible. Dr. Fisk added that there are examples of where missions were costed under one set of procedures, but were implemented after a different set of procedures were put in place. The result was cost growth to the mission. The question is: Is this additional oversight necessary, or are there more cost-efficient procedures for small missions?

Dr. Kennel commented on the progress in Lunar Science planning. There is a big opportunity for science in the Lunar Exploration Program. The issues of lunar science planning are twofold: 1) the development of a lunar science community commensurate with the opportunity; and 2) communication of new ideas. It is important to attract a new generation of scientists. We cannot be certain that we have sampled all of the ideas, and NASA should encourage the communication of new ideas. The Science Committee encourages an early and intimate coordination between SMD and the Exploration Systems Mission Directorate (ESMD). The Council and its Science Committee should sponsor a Conference on Lunar Science Planning. A timeframe has been selected—week of February 26, 2007—and Dr. Brad Joliff has agreed to serve as General Chairman. The Space Studies Board Phase 1 Report will be available by October 1.

Each Subcommittee has been asked to conduct a community outreach activity by November. This should provide the Subcommittees with what new ideas might be out there. SMD has been requested to put plans for Lunar science into its budget, which should be briefed to the Science Committee at the meeting after next. At the same time, the February-March timeframe is appropriate for other activities. Lunar sortie science concept study proposals should be selected by March.

Senator Schmitt stated that there is an integration of two parallel efforts. One of the purposes for a Workshop is for the Council to be in a position in the early July timeframe to specifically advise the Administrator on the science that is incorporated in ESMD'S formal draft Lunar Architecture. The Exploration Committee will start to consider a similar process in the same timeframe for the non-science aspects of the Architecture. SMD and ESMD have a responsibility to move forward in parallel and create an architecture and a science plan. A portion of the lunar science community is very vibrant and has been extremely active for many decades. Many of those people are represented in the Planetary Science Subcommittee and the various analysis and working groups. This Workshop in late February will involve an ESMD logistics manager. Senator Schmitt suggested that SMD consider elevating lunar science in the current science plan. The Council will review the draft architecture and lunar science plan in July, but will also have a rather extensive report at its April meeting.

Dr. Fisk commented that the opportunities for science in the next 10 to 15 years are rather limited; therefore, we must distill the very best that can be done in this timeframe within the resources available. The process of casting the net widely is wise, but the question is how to distill that down to something practical in the near term. It would be helpful if some guidelines on the range of opportunities could be available. Senator Schmitt added that the development of a preliminary range of operational constraints is important for the Workshop. In response to a question from Dr. Logsdon, Senator Schmitt noted that the current schedule of the Workshop is based upon the schedule of architecture activities. One of the reasons for the Subcommittee work in the September/October timeframe is to evaluate the strategy component of the public "rollout" of the Architecture that will be given by ESMD in December. Dr. Robinson commented that there is an ongoing ESMD effort to review and improve exploration goals. Many members of the Subcommittees and working groups are involved in the telecons. Senator Schmitt added that the ESMD process is moving forward, and it is important that the science community be involved.

Dr. Longnecker questioned whether there is a need to do a smaller but parallel version of this in the biomedical area. As an example, the artificial gravity program has been put aside due to funding issues. There are fundamental questions on what partial gravity provides, and we don’t know the answers. Collecting some information area in the biological realm could be important. Senator Schmitt asked the Ad Hoc Biomedical Committee to consider putting this on its agenda for discussion by ESMD.

Dr. Kennel summarized the Committee comments on Lunar Science Planning. SMD should brief the Science Committee on its lunar science plans in March 2007. This should include the results of Subcommittee discussions and the results of the Lunar Sortie

science solicitation. SMD should fund early science input to robotic lunar missions, including capture of LRO data in the Planetary Data System, and participating scientists and data analysis from LRO and subsequent LPRP missions.

With respect to SMD's specific "Science Plan," feedback from the Subcommittees indicates that development of the Plan is proceeding well. The Science Committee re-emphasizes that the Science Plan should be robust enough to guide SMD choices if budget is greater or less than currently projected. The Science Committee will review SMD's overall responses to comments received from Subcommittees, the NRC/Space Studies Board, and others at the October meeting. In response to a question from Senator Schmitt about distribution of the draft of the Science Plan to Council members, Dr. Kennel indicated that the next draft would be available for the October meeting.

***Human Capital Committee Report and Discussion***

Dr. Kulcinski reported on the Human Capital Committee. There were no major new recommendations at this time. He discussed activities since the last meeting, the NASA Education Program, NASA's Small and Disadvantaged Business Program, and future directions. There have been several meetings with the NASA Education staff in Washington. The Committee has received and started to review some NASA materials for Ad Hoc Education Partnerships. Several other documents have been received and reviewed. There were three presentations at the Committee meeting on July 19: a presentation on the Office of Education's International Education Activities; a presentation on NASA's student pipeline; and a presentation on the Office of Small and Disadvantaged Business Utilization (OSDBU).

Dr. Kulcinski presented the Committee's comments and observations on what it has learned. The Education Office is in a state of flux due to recent personnel changes. These changes have affected the timely transition of information to the Human Capital Committee. NASA does not currently have a coherent picture of the entire Agency scope of "partners" in education. There still is not a comprehensive program in NASA to focus on the "Best and Brightest" (i.e., the top 5% in the country). It appears that there is a positive effort to consider new directions in NASA/Education partnerships. The Human Capital Committee requested a more detailed listing of current partners in education to review the status of the partnerships. Senator Schmitt noted that due to interactions with the Human Capital Committee and other members of the Council, the Deputy Administrator is starting to take a close look at the entire Agency education program.

The Committee observed that the program to attract underrepresented students to NASA has been implemented with positive results. Senator Schmitt noted that some concern has been expressed about the process under which co-ops are selected. This relates back to the "best and brightest" issue. Dr. Kulcinski stated that programs for exposure of US students to International Space Programs are underway and the Education Office is open to suggestions on how to improve them. The use of Non-Governmental Organizations (NGO's) should be included in the current discussion for international educational partnerships. The Office needs to investigate, for example, the use of the Space University to enhance the exposure of Americans to non-US space programs. The staff at

the Education Office feels that they are restrained by current US regulations to employ talented non-US engineers and scientists in NASA.

Dr. Kulcinski noted that the staff at the Education Office is willing to start a dialog to address the issue of involving non-US graduates in NASA projects. This is a welcome positive action. The current attitude in government agencies seems to be that the net flow of information out of the country outweighs the advantages that could accrue due to the employment of bright, non-US graduates in the US space program. Dr. Tyson noted that this prevailing attitude may have contributed to departure of graduates back to their home countries. Dr. Fisk added that the American aerospace industry will not hire international students due to International Traffic in Arms Regulations (ITAR) and other factors, and yet the research universities are attracting some of the best students in the world. These students are extremely frustrated because they want to work in this country. If NASA could do something in this area, the Agency would have an opportunity at a talent pool that is not available to industry. Senator Schmitt suggested that the Human Capital Committee continue to work this issue and try to find a path through this problem. Dr. Colladay observed that the aerospace industry does hire internationals, but they cannot work on NASA programs or some Department of Defense (DoD) programs. [During the discussion on International Education, Dr. John Logsdon recused himself from the Council meeting.]

Dr. Kulcinski reviewed the Committee's observations on the OSDBU. NASA has had an exemplary record of including small disadvantaged businesses (SDBs) in its programs. The OSDBU has suffered severe losses in key personnel in the past year. This situation needs to be rectified if NASA hopes to continue its past productive interaction with US small business. Mr. Maddox noted that the OSDBU was established to get SDBs into NASA's programs. NASA became the government leader in terms of total procurement dollars and percent of dollars to SDBs. A study was conducted to determine what happened to the 8(a) businesses after 10 years. About 76% of the NASA SDB's were still in business after 10 years. The Agency discovered that it was less expensive to do business with these entities than some of the larger, traditional aerospace contractors. It is simply good business practice to do business with these SDB's. It would be unfortunate for NASA to lose this status. Every year there are new businesses created, and these entities need the same training, leadership, and opportunities. Gen. Lyles added that a forcing function, in terms of percentages of SDB in government contracting, is still needed.

Dr. Kulcinski continued with the Committee comments. The Mentor Protégé Program should be examined for inclusiveness (i.e., veteran-owned businesses). NASA should be careful not to reduce its level of contracting with SDBs because of their significant contribution to quality level contracting. This is not a formal recommendation.

Future Committee activities include: step up of analysis of NASA/Educational Partnerships; participation in National Academy of Sciences (NAS)/National Research Council (NRC) national debates on increasing the attention to Science, Technology, Engineering and Mathematics (STEM) issues; and work with the Science Committee on

communications concerning the purpose of and results from the major Lunar Science Workshop next February/March. Senator Schmitt noted that there may be a breakout session at the Workshop on how to mobilize educational outreach related to science in the Lunar Architecture. In response to a question about why it would take another six months for the Education Office to become focused, Dr. Kulcinski indicated that there are several issues, one of which is the distributed nature of education programs in NASA. Another is the number of Congressional earmarks. Senator Schmitt added that frustration has reached the level of the Deputy Administrator, and she has taken personal interest in this issue. Dr. Colladay noted that part of the problem is the result of education being a distributed mission objective.

Mr. Armstrong noted that he was very impressed with NASA's contribution to the celebration of the centennial of flight three years ago. NASA materials were available everywhere across the country. Senator Schmitt commented that there have been some policy changes that have made it more difficult for NASA personnel to participate as "invitees" in activities sponsored by other organizations. He suggested that the Committee might want to look into this issue. Dr. Fisk noted that in the 2005 authorization act, NASA was directed to get an NRC study on K-12 education and development of a strategic plan for education. The Committee might want to follow up on the status of this study. Dr. Colladay suggested that the Human Capital Committee start a joint activity with the Aeronautics Committee, similar to that being done with the Science Committee.

***Exploration Committee Report and Discussion***

Capt. Rick Hauck reported for the Exploration Committee as the acting Chairman. The recommendation on biomedical research for long-duration missions reflected the Committee's concern that insufficient funds were available to develop low Technology Readiness Level (TRL) items. Part of the recommendation was to foster relationships with other government agencies. Dr. Stephen Katz reported on his initiative to identify previous and potential collaborations with The National Institutes of Health (NIH) and other federal agencies. The Ad Hoc Biomedical Committee, in cooperation with the NIH, will schedule an interagency meeting to review areas of mutual interest (NIH, FDA, NSF, NIST, and NASA). The purpose of this meeting is to update participants on the relevant research activities of each agency, identify common goals, and discuss interagency collaboration. Capt. Hauck noted that the Committee received a briefing on the outgrowth of technologies from space life sciences that have general biomedical applications and cited some recent developments and meetings in this arena. Senator Schmitt suggested consideration of the increasing use of simulation in surgery and other areas.

The Exploration Committee received two status reports from NASA. The first was on the Human Research Program. The Program is in the process of reformulation and transition to mitigate the highest risks to crew health and performance during exploration missions. The Program has initiated centralization of distributed space flight medical data sets and determination of appropriate access and distribution processes (data mining). The National Space Biomedical Research Institute (NSBRI) received a 20%

budget cut and has gone through re-scoping efforts. Senator Schmitt discussed his experience at a recent "summit" under the National Space Biomedical Research Institute (NSBRI) program. The International Space Station Medical Project has been established to collect medical data sets and develop medical standards and protocols. Strategic planning processes have been established to work with medical operations based on a 20-year view and several workshops have been held. The Human Research Program has been working diligently and is eager to brief the Committee on its risk mitigation strategies that will help cope with funding limitations and place priorities where appropriate.

In response to a question from Mr. Armstrong, Dr. Longnecker noted that the work on providing artificial gravity for long duration flights is on hold and is no longer being funded. One of the challenges for the Committee is where the priorities should be placed by NASA (engineering research in artificial gravity versus medical research for microgravity). It is well above the mission directorate level. Dr. Fisk noted that at an earlier meeting, there was discussion about the number of biomedical research grants that were terminated as a result of funding reductions. This, he stated, has effectively destroyed the external research community. These very research organizations will be needed for long-duration space flight.

Senator Schmitt commented, as he did at the May Subcommittee Conference, that the academic institutions should look very seriously at providing some "bridge financing" for important work so that the cuts are mitigated. All affected institutions should be looking "out of the box" for ways to bridge the gap. Dr. Fisk observed that the problem is that there is little confidence among the institutions that the NASA funding will increase in the future to form the other side of the "bridge." In response to a comment from Mr. McPherson, Mr. Hanisee noted that there was an initiative under the previous Administrator to commercialize Center innovations and new technology. Dr. Kennel stated that the previous NASA Advisory Council found that the Human Research Program on the ISS was first class research and should continue. It is particularly disappointing to see that this research has been cut. (see comments at the end of this section by Dr. Kulcinski and others on this subject.)

Dr. Covert commented on the myth of "university-sponsored research." He noted that research is heavily dependent on either private donors or the government. Dr. Austin added that the Council could task program offices to be more forthcoming regarding the effects and risks of loss of investment in research and technology. Capt. Hauck indicated that risk mitigation strategies will be on the agenda for the next Committee meeting.

The Committee also received a status report on Extravehicular Activity (EVA) systems. Mr. Armstrong and Dr. Schmitt participated in a glove dexterity demonstration on Monday, July 17. It was noted that EVA people do not place glove improvement at the top of their priority list. Capt. Hauck reported that the Committee members had an opportunity to interact with a number of enthusiastic, young engineers and co-ops. One of the major considerations in EVA systems is a significant reorganization and development of the project office. The EVA Systems Division is also coping with only

being able to deal with near-term objectives due to insufficient funding. Although it does not have a recommendation at this time, the Committee is concerned that this is endemic and may be permeating all of the programs. The Committee would like to review the Crew Exploration Vehicle (CEV) at the next meeting. The CEV-related space suit Request for Proposal is scheduled for release in May 2007. It remains to be seen whether one suit could serve all regimes. Upon questioning, the Program Office indicated that it would need a $10 million per year increase in the near term. The Office is looking at what would be needed in the longer term.

The Committee had the following formal observations:

- One program and one project briefing have indicated budget-driven narrowing of scope to near-term, highest priority objectives
- This may have implications for the ability to achieve longer-term objectives.

Senator Schmitt questioned whether the Council should formulate a recommendation regarding evaluation of the risks as a result of limited funding in these areas. Capt. Hauck noted that it would be difficult for the Committee to say that EVA and Human Research are the top priorities, since those are the only programs that it has been briefed on. Dr. Fisk observed that risk comes from failure to fund the lower TRL areas. The question is: What fraction of the research budget should be spent on the lower TRL? The Committee discussed whether it would be possible to determine risk associated with under-funding certain areas. Senator Schmitt observed that there are ways to look at risk in terms of efficiency and quality of work. Dr. Kennel noted that a critical point is the bottleneck around 2010, and questions could be asked in a different way, e.g., what things should be examined over the next three years? Dr. Logsdon noted that the Council has a wide and diverse expertise. This group could say that it doesn't feel comfortable with the risks that are being taken by the focus on short term. A well-crafted statement might be useful in the debate over the emergency supplemental. Senator Schmitt indicated that he would ask the Administrator whether something like that would be helpful.

Capt. Hauck reported that the Exploration Committee will consider developing subcommittee(s) to review the lunar architecture when announced. The Exploration Committee would like to get an updated briefing on the CEV after contract award. Senator Schmitt indicated that a review of the Commercial Orbital Transportation System (COTS) and CEV contracts at the Council level if members prefer. General Lyles felt that the Council should look at all of the major reviews. Dr. Logsdon noted that September 8 is the target date for architecture announcement. Senator Schmitt took an action to see how the Council could schedule a review of the CEV and possibly COTS into the agenda at the October meeting.

Capt. Hauck indicated that the Committee intends to pursue the Ad Hoc Biomedical Committee objectives as previously described. The Committee was impressed by the directness with which the information was presented, and complemented JSC on its presentations. In response to a comment, Senator Schmitt indicated that in the suit area, there are only two industry competitors. Ms. DiGennaro asked what is being done to

incorporate education and public outreach in the glove competition. This could be a good opportunity for a step in a positive direction. Also, the centennial competition should have some visibility.

As he did not have the opportunity earlier, Dr. Kulcinski recounted his experience with the idea of university-sponsored research. He took this idea to the Chancellor of the University of Wisconsin. The first reaction was negative; subsequently, there were a couple of ideas that the Chancellor was willing to look at in terms of long-term investment. Therefore, at least at one university, the idea is not dead. After getting past the initial barriers, there may be some ways for an institution to consider university or donor money for "bridge" funding. If one or two Chancellors or Presidents can be convinced, it may start a positive dialog at other institutions. Dr. Fisk continued to express skepticism that any private sector bridge funding would be possible.

***Aeronautics Committee Report and Discussion***

Gen. Lyles reported on the Aeronautics Committee as Mr. Armstrong had to depart for the airport at this point. He addressed Committee membership, the National Research Council's (NRC's) Decadal Survey of Civil Aeronautics, NASA Aeronautical Test Facilities, and future focus areas. The Committee is looking for a replacement member for Dr. Juan Alonso, who has taken a position as the Director of the Fundamental Aeronautics Program Office at NASA Headquarters. It has brainstormed several names from industry and universities. The Committee is in the process of coming up with several candidates and will submit recommendations to the Council Chair in the next week or two.

The NRC Decadal Survey has been provided to the Committee. The Survey was initiated when the Aeronautical Safety and Engineering Board (ASEB) noticed and became alarmed at the erosion of funding in NASA Aeronautics. Dr. Lisa Porter, Associate Administrator for the Aeronautics Research Mission Directorate (ARMD), requested that the foundation of the study be the five most needed advances in aeronautics. The NRC could not identify five advances, but did identify the five most promising research areas and the effort was organized into five panels: (1) aerodynamics and aeroacoustics; (2) propulsion and power; (3) materials and structures; (4) dynamics, navigation and control, and avionics; and (5) intelligent and autonomous systems, operations and decision-making, human integrated systems, and networking and communications. The study culminated in 51 high priority research and technology (R&T) challenges, equally divided among six objectives.

Gen. Lyles briefly reviewed the Survey recommendations. Some of these recommendations will require leadership above the NASA level. One of Dr. Porter's key concerns is fundamental research, and this falls in line with what the NRC is recommending. One of the recommendations is that the US government should conduct a high-level review of organizational options for ensuring US leadership in civil aeronautics. Dr. Covert noted that one of the key aspects is cross-disciplinary approaches in the five themes. Dr. Colladay added that one of the driving messages is that aeronautics is not as mature an area of research as some people would suggest, and the

technological challenges are extremely important to civil aviation. The driving objectives are all designed to address the Next Generation Air Transportation System (NGATS), and NASA is the major source of aeronautics R&D in this context. The big issue is how much money will be available to work in the most important areas. There isn't enough money to accomplish what is needed through contracting; therefore, industry must partner in a culture of cooperation with NASA. Gen. Lyles noted that in addition to the 51 technology challenges, the study also addressed the organizational barriers. Dr. Covert observed that the Europeans have a specific goal to be leaders in aeronautical technology by 2020. The Decadal Study calls attention to the aeronautics history in the US, and attempts to create a dialog that would lead to an understanding that to conform to the Space Act of 1958, we would have to provide leadership in aeronautics.

Gen. Lyles noted that Dr. Porter reported that the existing NASA program was fairly well aligned with the study recommendations, and there were no major disconnects. However, there were a few areas of concern to the NRC, e.g., the imbalance between the funding of internal and external (now 70/30) of aeronautical research. This needs further examination. The NRC feels that NASA is trying to fit too much into its Aeronautics "bag." Leveraging will be essential. As noted earlier, the NRC recommended that the US government conduct a high-level review of organizational options for ensuring US leadership in civil aeronautics, and identified the need for a commission to determine the "how" of this recommendation. There is effort underway to develop a policy for US leadership in aeronautics, but the recommended commission has not yet been established. The Committee will be closely watching the execution of the Aeronautics Program. In response to a question from Senator Schmitt as to the comparison of the present aeronautics research and that of the industrial partnerships of the National Advisory Committee on Aeronautics, the precursor to NASA, Dr. Colladay indicated that industry uses NASA facilities for its own industry-funded research, e.g., the use of wind tunnels. The Committee will examine utilization and technology requirements from the joint NASA/FAA/DOD office at one of its future meetings.

The Committee received a briefing from Mr. Blair Glass, Director of the Aeronautics Test Program and Dr. Phil Anton, RAND Corporation, on Aeronautics Test Facilities. Dr. Lyles presented a chart showing US government wind tunnels that are operational, closed, and about to be mothballed in FY07. None of the facilities were built very recently. He compared the operational US facilities with the European facilities. All of the European facilities are a generation younger than the US facilities. In response to a question from Dr. Tyson, Gen. Lyles noted that all of the facilities play a significant role in understanding the NGATS. Dr. Colladay added that there is a "routine" feeling about air travel today that we take for granted. The only facility that is missing that might be needed in the next 20 years is in hypersonics.

We will continue to see evolutionary improvement in the airplane, but the biggest improvements will be in the air traffic system to safely handle more airplanes in the sky. Dr. Covert agreed that there would be evolutionary changes. The real choke point and the place where great advances are needed is in airports. One of the questions is: Are there technical advances that will allow the airport to be more efficient? Many possible

changes are not readily apparent to the eye. The point in aeronautics is not whether something is possible, but whether it is economically feasible, i.e., whether profits can be made. Dr. Colladay commented that in time, supersonic air travel will yield to some economic solution, but more R&D is required to minimize the pressure wave (sonic boom) when flying over land. Increased system capacity is the driver in what is most important in prioritizing the R&D challenges.

Dr. Lyles showed the major studies related to NASA wind tunnels since 1993. He noted that the Aeronautics Committee was pleased that NASA has established goals of corporate management of facilities. The Agency is trying to identify future facility needs. Continued maintenance investments and upgrades are essential, and the Committee is not convinced that the budgets for these investments are adequate. In response to a question from Senator Schmitt, Gen. Lyles summarized that the Committee could recommend at this time that NASA ensure that maintenance of these facilities is on the high-priority funding list.

Gen. Lyles discussed some future focus areas for the Aeronautics Committee. Industry feels left out of the current aeronautics planning, and the Committee will request a briefing from John Douglas of the AIA before the next meeting. There is concern over the backlog of maintenance and repair in the NASA Aeronautics test facilities, and the Committee will take a closer look at this area. There are a lot of other facilities and infrastructure not covered under the Aeronautics Test Program. The Committee recommends a briefing by NASA's Strategic Capability Assets Program Manager to the full Council. Senator Schmitt took this as one of the recommendations for the agenda for the October meeting. In response to a question from Senator Schmitt, Gen. Lyles noted that the Committee plans to look further into thermal protection systems and technology. Senator Schmitt observed that this is also a subsystem of the Exploration Initiative.

***Council Discussion on Recommendations***

Audit and Finance:

1) Agency-wide implementation of JSC error tracking tool
2) Agency initiate a financial management customer satisfaction survey for managing contractor relationships

Science:

1) Streamline the flow of subcommittee recommendations to the Council. Distinguish between strategic and tactical recommendations. Strategic recommendations as normal from the Council to the Administrator; tactical recommendations go directly to SMD at the same time as they go to the Administrator.

The Council continued discussion on this recommendation and reservations about its acceptability were expressed by several Council members. The Council agreed to distinguish between strategic and tactical recommendations in the reports of the Subcommittees and the Science Committee. One question is whether the SMD Associate

Administrator (Dr. Cleave) personally sees the Subcommittee letters. Senator Schmitt agreed to take suggestions regarding the transmission of the letters under advisement. He offered to explore with the Administrator whether he would accept the direct transmission of "tactical" recommendations to SMD AA, but expressed doubt that this would be possible under the NAC guidelines.

2) SMD should fund early science input to robotic lunar missions.
    - Capture of LRO data in the Planetary Data System long-term archive.
    - Data analysis and participating scientists from LRO and subsequent LPRP missions.

Senator Schmitt adjourned the meeting at 4:35. He requested a response from members on whether they could be available a day prior to the next regularly scheduled meeting, October 11-12, 2006.

**NASA Advisory Council Meeting**
**Houston, TX**
**July 20, 2006**

Meeting Location
Hilton Houston NASA Clear Lake
Admiral A&B Conference Room
3000 NASA Road One
Houston, TX 77058-4322
Ph: 281-333-9300

Thursday, July 20, 2006

| | | |
|---|---|---|
| 8:00 a.m. | General Discussion | |
| 8:30 a.m. | Audit and Finance Committee Report and Discussion | Mr. Robert Hanisee |
| 9:45 a.m. | Science Committee Report and Discussion | Dr. Charles Kennel |
| 11:00 a.m. | Break | |
| 11:15 a.m. | Human Capital Committee Report and Discussion | Dr. Gerald Kulcinski |
| 12:30 p.m. | Lunch | |
| 2:00 p.m. | Exploration Committee Report and Discussion | Capt. Rick Hauck |
| 3:15 p.m. | Aeronautics Committee Report and Discussion | Gen. Lester Lyles |
| 4:30 p.m. | Council Discussion and Agreement on Recommendations | |
| 5:00 p.m. | Adjournment | |

**NASA Advisory Council Members**
July 20, 2006

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|---|---|
| Chair | • Hon. Harrison H. Schmitt, Apollo 17 Astronaut and Scientist |
| Aeronautics Committee | • *Chair: Mr. Neil Armstrong, Apollo 11 Astronaut*<br>• General Lester L. Lyles, USAF (Ret.), Consultant, The Lyles Group<br>• Dr. Eugene Covert, T. Wilson Professor of Aeronautics, Emeritus, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology |
| Audit and Finance Committee | • *Chair: Mr. Robert M. Hanisee, Trust Company of the West*<br>• Hon. Edward R. "Ted" McPherson, Chief Executive, Intersolve Group, Inc.<br>• Hon. Michael Montelongo, Senior Vice President, Strategic Marketing, Sodexho Inc.<br>• Mr. Howard J. Stanislawski, Partner, Sidley Austin, LLP |
| Exploration Committee | • *Chair (Acting): Capt. Frederick (Rick) Hauck, USN (Ret.)*<br>• Dr. Wanda M. Austin, Senior Vice President, National Systems Group, The Aerospace Corporation<br>• Dr. Stephen I. Katz, M.D., Ph.D., Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases<br>• Dr. John M. Logsdon, Director, Space Policy Institute, George Washington University<br>• Dr. David Longnecker, Institute of Medicine, National Research Council |
| Human Capital Committee | • *Chair: Dr. Gerald L. Kulcinski, Associate Dean of Research, College of Engineering, University of Wisconsin-Madison*<br>• Ms. Joann DiGennaro, President, Center for Excellence in Education<br>• Mr. Wendell Maddox, President and Chief Executive Officer, ION Corporation<br>• Dr. R. James Milgram, Professor, Department of Mathematics, Stanford University |
| Science Committee | • *Chair: Dr. Charles F. Kennel, Director and Vice Chancellor of Marine Sciences, Scripps Institute of Oceanography*<br>• Dr. Mark S. Robinson, Research Associate Professor, Department of Geological Sciences, Northwestern University<br>• Dr. Neil DeGrasse Tyson, Frederick P. Rose Director, Hayden Planetarium, Department of Astrophysics, American Museum of Natural History |
| *Ex-Officio* | • Dr. Raymond S. Colladay, Chair, Aeronautics and Space Engineering Board, National Research Council<br>• Dr. Lennard A. Fisk, Chair, Space Studies Board, National Research Council |
| Unable to Attend | • Lieutenant General James A. Abrahamson, USAF (Ret.)<br>• Dr. Wesley T. Huntress, Jr., Director, Geophysical Laboratory, Carnegie Institution of Washington<br>• Ms. Kay Coles James, Senior Partner, J.C. Watts Companies<br>• Dr. Bradley L. Jolliff, Research Associate Professor, Department of Earth and Planetary Sciences, Washington University<br>• Dr. Eugene H. Levy, Provost and Professor of Physics and Astronomy, Rice University |

**NASA ADVISORY COUNCIL**
**Hilton Houston NASA Clear Lake**
**Houston, TX**
**July 20, 2006**

## MEETING ATTENDEES

### *Council Members:*

| | |
|---|---|
| Schmitt, Harrison H. *(Chair)* | Astronaut and Scientist |
| Armstrong, Neil | Astronaut and Scientist |
| Austin, Wanda | The Aerospace Corporation |
| Blackerby, Christopher *(Executive Director)* | NASA Headquarters |
| Colladay, Raymond *(Ex-Officio)* | Aeronautics and Space Engineering Board |
| Covert, Eugene | Massachusetts Institute of Technology |
| DiGennaro, Joann | Center for Excellence in Education |
| Fisk, Lennard A. *(Ex-Officio)* | Space Studies Board |
| Hanisee, Robert M. | Trust Company of the West |
| Hauck, Rick | USN (Ret.) |
| Katz, Stephen | NIAMSD |
| Kennel, Charles | Scripps Institute of Oceanography |
| Kulcinski, Gerald | University of Wisconsin-Madison |
| Logsdon, John | George Washington University |
| Longnecker, David | IOM, National Research Council |
| Lyles, Lester | USAF (Ret.) |
| Maddox, Wendell | ION Corporation |
| McPherson, Edward R. | Intersolve Group |
| Milgram, R. James | Stanford University |
| Montelongo, Michael | Sodexho, Inc. |
| Robinson, Mark | Northwestern University |
| Tyson, Neil DeGrasse | American Museum of Natural History |

### *NASA Attendees:*

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|---|---|
| Cremins, Tom | NASA Headquarters |
| Dunwoody, Cathy | NASA Headquarters |
| Ferguson, Adrienne | NASA Headquarters |
| Green, Thomas | NASA Headquarters |
| Hawes, Mike | NASA Headquarters |
| Hertz, Paul | NASA Headquarters |
| King, Marla | NASA Headquarters |
| Krezel, Jonathan | NASA Headquarters |
| Ostrach, Louis | NASA Headquarters |

| | |
|---|---|
| Pellis, Neal R. | NASA/JSC |
| Williams, Greg | NASA Headquarters |

***Other Attendees:***

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|---|---|
| Becker, Jeanne | NSBRI |
| Fiedler, Edna | NSBRI |
| Ford, Bob | Texas Southern University |
| George, Barbara | Dyffryn School, U.K. |
| Grocott, Mike | Callington Space Centre |
| Hamilton, John | [not affiliated] |
| Hammond, Neal | United Space Alliance |
| Jejelowo, Aio | [not affiliated] |
| Jejelowo, Fisayo | Texas Southern University |
| Johnson, Cornell | Candchet Assoc. Inc. |
| Kring, David A. | Lunar & Planetary Institute |
| Lippincott, Tanya | CDAIS |
| Mami, Gwendolyn M. | Texas Southern University |
| March, Ellen | Barrios Technology |
| Margon, Bruce | STScI |
| Morgan, Jane | Neath Port Talbot College, U.K. |
| Nelson, Don | [ret. NASA] |
| Pearlman, Robert | CollectSpace |
| Pierson, Tom | SETI Institute |
| Reed, Cheryl L.B. | JHU/APL |
| Renteria, Anita | Barrios Technology |
| Reynolds, Will | Venrise |
| Swanson, Bob | Spacehab, Inc. |
| Temple, David | [not affiliated] |
| Tylko, John | Aurora Flight Sciences |
| Weiss, Roger H. | SAIC |

**NASA ADVISORY COUNCIL**
**Hilton Houston NASA Clear Lake**
**Houston, TX**
**July 20, 2006**

LIST OF PRESENTATION MATERIAL[1]

1) Report of Audit & Finance Committee [Hanisee]
2) Report of Exploration Committee [Hauck]
3) Report of Human Capital Committee [Kulcinski]
4) Report of Science Committee [Kennel]
5) Report of Aeronautics Committee [Lyles]

Other material distributed at the meeting:

1) Common Recommendations from the NAC Science Subcommittee
2) Letter from H. Schmitt to M. Griffin, July 11, 2006, Council Recommendations
3) May Meeting Minutes

[1] Presentation and other material distributed at the meeting is on file at NASA Headquarters, OER/ACMD, 300 E Street SW, Washington, DC 20546.